

Remarks

In the office action mailed August 3, 2005, the Examiner rejected claims 1-17 under 35 U.S.C. § 102(b) as being anticipated by Fukasawa (U.S. Pat. No. 5,533,012). Applicant has amended claims 1-17 for editorial clarity and to better protect the invention. Applicants believe these amendments and claim cancellations tend to be Examiner's rejections.

35 U.S.C. § 102 Rejections

Re independent claim 1, the Examiner rejected claim 1 stating that Fukasawa discloses in a carrier interferometry (CI) communication system, a method for communicating comprising providing for spatial processing of the received signals.

Applicant respectfully disagrees. Fukasawa does not describe a CI communication system, but rather, a CDMA communication system. Also, Fukasawa does not teach spatial processing, but rather, multi-user detection without any benefit of spatial processing.

In particular, Fukasawa shows a CDMA system, which is substantially different than a CI system. For example, Fukasawa describes spreading codes that are constant-amplitude and bi-phase (col. 3, line 53; col. 5, line 29), such as pseudo-noise sequences or Walsh-Hadamard codes (col. 5, lines 28-36). However, CI codes are not bi-phase. Rather, CI codes are typically polyphase and/or poly-amplitude.

Furthermore, Fukasawa's teaching of interference cancellation is not configured for performing spatial processing. Rather, Fukasawa disregards channel conditions that enable spatial processing to be performed. Fukasawa neglects channel effects such as multipath, which causes interference due to loss of synchronicity (i.e., orthogonality) of the transmitted spreading codes. Instead, Fukasawa states that synchronization of different spreading codes presents no problem on the downstream channel (col. 1, lines 46-47), which is incorrect if multipath occurs. Thus, Fukasawa fails to realize that interference due to multipath enables spatial processing to be performed (i.e., the separation of a plurality of signals transmitted in the same subchannel from different spatially separated transmitters), which can increase frequency reuse. Instead, Fukasawa

teaches that mutually orthogonal spreading codes are preferable (col. 3, lines 46-50). Since there are a limited number of orthogonal spreading codes, their use in propagation channels (which tend to correlate these coded signals anyway) neither provides frequency reuse nor suggests that spatial processing is used to receive the signals. Rather, if spatial processing were taught by Fukasawa, it would not be preferable or useful to employ mutually orthogonal spreading codes or approximately orthogonal spreading codes, because different channel conditions or different directions of arrival would be sufficient to separate received user signals.

Accordingly, Applicant believes claim 1 is in condition for allowance. Applicant therefore respectfully requests reconsideration and allowance of claim 1.

Re claims 2-5, the arguments regarding CI communication and spatial processing discussed with respect to claim 1 apply herein as well, *mutatis mutandis*. Applicant therefore respectfully requests reconsideration and allowance of claims 2-5.

Re independent claim 6, the Examiner rejected claim 6 stating that Fukasawa discloses a CI transmission system, including the improvement wherein at least one of the carrier-signal generator and the modulator being adapted to provide the modulated carrier signals with an incremental phase relationship that facilitates separation of multiple information signals modulated onto the same carrier signals by orthogonally positioning data-modulated *pulse waveforms* produced from a *superposition of the carrier signals*.

Applicant respectfully disagrees. Fukasawa does not describe a CI transmission system, but rather, a CDMA system. Also, Fukasawa does not teach orthogonally positioning data-modulated *pulse waveforms* produced from a *superposition of the carrier signals*.

The arguments regarding CI communication discussed with respect to claim 1 apply herein as well, *mutatis mutandis*. Furthermore, Fukasawa teaches using two mutually orthogonal in-phase (I) and quadrature phase (Q) carriers. The carriers have the same frequency (they are I and Q components having a common carrier frequency f_c) (col. 3, lines 30-32; col. 6, lines 6-16; and col. 6, lines 24-37). Since Fukasawa's carriers have the same frequency, a superposition of these carriers is incapable of producing pulse waveforms. This is because a CI pulse waveform results from in-phase combining of the carriers, whereas I and Q waveforms (by definition) have a fixed phase offset of $\pi/2$.

Accordingly, Applicant believes claim 6 is in condition for allowance. Applicant therefore respectfully requests reconsideration and allowance of claim 6.

Re claims 7 and 8, the arguments regarding CI communication and pulse waveforms discussed with respect to claims 1 and 6, respectively, apply herein as well, *mutatis mutandis*. Applicant therefore respectfully requests reconsideration and allowance of claims 7 and 8.

Re independent claim 9, the Examiner rejected claim 9 stating that Fukasawa discloses a CI transmission system, including the improvement wherein at least one of the carrier-signal generator and the modulator being adapted to provide the modulated carrier signals with an incremental phase relationship that facilitates separation of multiple information signals modulated onto the same carrier signals by orthogonally positioning data-modulated *pulse waveforms* produced from a *superposition of the carrier signals*.

Applicant respectfully disagrees. Fukasawa does not describe a CI transmission system, but rather, a CDMA system. Also, Fukasawa does not teach orthogonally positioning data-modulated *pulse waveforms* produced from a *superposition of the carrier signals*.

The arguments regarding CI communication discussed with respect to claim 1 and CI pulse waveforms discussed with respect to claim 6 apply herein as well, *mutatis mutandis*. Accordingly, Applicant believes claim 9 is in condition for allowance. Applicant therefore respectfully requests reconsideration and allowance of claim 9.

Re claims 10 and 11, the arguments regarding CI communication and pulse waveforms apply herein as well, *mutatis mutandis*. Applicant therefore respectfully requests reconsideration and allowance of claims 10 and 11.

Re independent claim 12, the Examiner rejected claim 12 stating that Fukasawa discloses a CI receiver system, including a combiner capable of combining the received modulated carrier signals to separate at least one desired information symbol from at least one interfering signal. The currently amended independent claim 12 now recites “—the combiner capable of combining the received modulated carrier signals to produce a superposition of the received modulated carrier signals characterized by at least one sequence of pulses for separating ~~separate~~ at least one desired information symbol from at least one interfering signal—”.

Applicant believes the currently amended independent claim 12 better distinguishes the claimed invention over Fukasawa. Fukasawa does not describe a CI transmission system, but rather, a CDMA system. Also, Fukasawa does not teach producing a sequence of pulses from a superposition of the carrier signals.

The arguments regarding CI communication discussed with respect to claim 1 and CI pulse waveforms discussed with respect to claim 6 apply herein as well, mutatis mutandis. Accordingly, Applicant believes claim 12 is in condition for allowance. Applicant therefore respectfully requests reconsideration and allowance of claim 12.

Re claims 13-15, the arguments regarding CI communication and pulse waveforms discussed with respect to claim apply herein as well, mutatis mutandis. Applicant therefore respectfully requests reconsideration and allowance of claims 13-15.

Re independent claim 16, the Examiner rejected claim 16 stating that Fukasawa discloses a CI receiver system, including a combiner capable of combining the received modulated carrier signals to separate at least one desired information symbol from at least one interfering signal. The currently amended independent claim 16 now recites “—the receiver adapted to be responsive to a plurality of CI-modulated carriers modulated with a plurality of information signals to generate at least one set of interfering information signals therefrom, each information signal being characterized by an information-modulated pulse waveform produced by a superposition of the plurality of CI-modulated carriers—”.

Applicant believes the currently amended independent claim 16 better distinguishes the claimed invention over Fukasawa. Fukasawa does not describe a CI transmission system, but rather, a CDMA system. Also, Fukasawa does not teach producing a sequence of pulses from a superposition of the carrier signals.

The arguments regarding CI communication discussed with respect to claim 1 and CI pulse waveforms discussed with respect to claim 6 apply herein as well, mutatis mutandis. Accordingly, Applicant believes claim 16 is in condition for allowance. Applicant therefore respectfully requests reconsideration and allowance of claim 16.

Re claims 17, the arguments regarding CI communication and pulse waveforms discussed with respect to claim apply herein as well, mutatis mutandis. Applicant therefore respectfully requests reconsideration and allowance of claims 17.

Conclusion

Applicants have thoroughly discussed each of the Examiner's rejections. Applicants have amended claims 12 and 16. Applicants believe that all pending claims are in condition for allowance and such disposition is respectfully requested. In the event that a telephone conversation would further prosecution and/or expedite allowance, the Examiner is invited to contact the undersigned.



Steve Shattil

15 S. 33rd St.

Boulder, CO 80305

303 554-9106

Respectfully submitted,